[METHOD FOR GENERATING 2D OVSF CODES IN MULTICARRIER DS-CDMA SYSTEMS]

Abstract of Disclosure

A code tree of two-dimensional orthogonal variable spreading factor (2D-OVSF) code matrices for a multicarrier direct-sequence code-division multiple-access (MC-DS/CDMA) communications system is generated by providing two sets of 2×2 orthogonal matrices $\{A^{(1)}_{(2 \times 2)}, A^{(2)}_{(2 \times 2)}\}$ and $\{B^{(1)}_{(2 \times 2)}, B^{(2)}_{(2 \times 2)}\}$. The first set of 2×2 matrices is used to generate a pair of sibling nodes in the code tree that respectively represent matrices $A^{(1)}_{(2\times 2^{\alpha})}$ and $A^{(2)}_{(2\times 2^{\alpha})}$ by iterating the relationship:

$$A(1)_{(2\times 2^{1+\beta})} = [A(1)_{(2\times 2^{\beta})} \quad A(2)_{(2\times 2^{\beta})}],$$

$$A(2)_{(2\times 2^{1+\beta})} = [A(1)_{(2\times 2^{\beta})} \quad -A(2)_{(2\times 2^{\beta})}].$$

The matrices $A^{(1)}_{(2\times 2^{\alpha})}$ and $A^{(2)}_{(2\times 2^{\alpha})}$ are used to generate a child node of one of the sibling nodes. The child node contains an $M \times N$ matrix, which is found by iterating the relationship:

$$A(i-1)_{(0\times P)} = [B^{(1)}_{(2\times 2)} \otimes A(i/2)_{(0/2 \times P/2)}]$$

$$A(i)_{(0\times P)} = [B^{(2)}_{(2\times 2)} \otimes A(i/2)_{(0/2 \times P/2)}],$$

where $\otimes$ indicates a Kronecker product.

Figures